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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/852,123	05/08/2001	Martin Czech	Micronas.6247	4156

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EXAMINER

MONDT, JOHANNES P

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 11/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/852,123

Applicant(s)

CZECH ET AL.

Examiner

Johannes P Mondt

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 August 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Amendment A filed 8/19/2002 and entered as Paper No. 9 forms the basis of the present Office Action. In Amendment A Applicant successfully amended claims 1, 2 and 6 to overcome the objections for reasons of minor informalities made in the Office Action of Paper No. 6. No other amendments have been made. Please be referred to "Response to Arguments" for the examiner's comments on Remarks by Applicant in Amendment A.

Response to Arguments

1. Applicant's arguments filed 08/19/2002 have been fully considered but they are not persuasive. In particular,

With regard to the traverse of the rejection under U.S.C. 103(a) of claim 1 over Avery in view of Wada et al: the two inventions of Avery and Wada are in the very same art, i.e., protection devices for semiconductor integrated circuits, while the reference given by the examiner to the one sentence of the English abstract verbatim recites the teaching Applicant requires examiner to show from the text of the prior art: the polysilicon resistor of Wada is explicitly mentioned as a means to more uniformly distribute the input surge voltage to ground while said polysilicon resistor 2 precedes the control connection made through the transistor, as also discussed in the previously cited portion of Wada (portion entitled "Constitution", first, second, third and fourth sentences). Although the specific teaching of Wada only discusses one transistor rather than a plurality of transistors (QL), consistent teaching of Wada to a structure with a

Art Unit: 2826

plurality of transistors such as Avery's as determined by one of ordinary skills in the art implies the application of said polysilicon resistor to each of the transistors. Regarding the alleged absence of a proper combination of references, it is true that Wada et al also teaches to vary the channel length, but that does not detract from their teaching of the inclusion of polysilicon resistor 2 but instead merely supplements said teaching, nor does this additional teaching on channel length variation in Wada et al necessarily conflict with the invention in Avery, because the channel lengths of QS and QL can both be varied without altering, not even in percentage, the ratio of their channel lengths. Therefore, it is readily possible to include the teaching by Wada et al on the polysilicon resistor 2 without causing the circuit of Avery to be inoperable; on the contrary: as spelled out by Wada et al in the specific portion of Wada et al previously cited, the inclusion of said polysilicon resistor helps to distribute the input surge voltage to ground more uniformly.

With regard to all other claims: the traverse exclusively depends on the traverse of the rejection under 103(a) of claim 1.

In view of the above, the art rejections are herewith maintained.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claim 1** is rejected under 35 U.S.C. 103(a) as being unpatentable over Avery (5,043,782) in view of Wada et al (JP361292351A). With reference to Fig. 7: Avery teaches (cf. "Field of Invention", column 1, lines 6-9) an electrostatic discharge (ESD) protective structure that protects an integrated circuit (cf. "Summary of Invention", first line) connected between a first voltage bus 20 (cf. column 4, line 27) with a first supply voltage (inherent) and a second voltage bus or reference line 22 (cf. column 4, lines 27-28), said electrostatic discharge protective structure comprising:

N.B.: also 18.

a plurality of laterally designed bipolar transistors QL (cf. column 6, lines 37-42) each having a first load line connected to the first voltage bus 20 and a second line connected to the second voltage bus 22, wherein said first load lines are electrically parallel and said second load lines are electrically parallel to one another (cf. Fig. 7), each of said (laterally designed bipolar) transistors including a control connection to one of the voltage buses, namely the second voltage bus 22 (cf. Fig. 7).

Avery also teaches a resistor (RS) co-integrated into a semiconductor body preceding the control connection for one of the aforementioned laterally designed bipolar transistors QL (the one on the left in Fig. 7; cf. also column 6, lines 44-46).

Avery does not necessarily teach a single-track resistor to precede every control connection in order to enable a large input surge voltage to be more uniformly dispersed.

However, Wada et al teach the application of a one track resistor 2 for this purpose in an input discharge protection circuit with parallel MIS transistors, as opposed to laterally designed bipolar transistors as in the case of Avery and Applicants (see Figure 2, Abstract, and Constitution in Wada et al). Therefore, it would have been obvious to one of ordinary skills in the art to modify the invention by Avery at the time it was made so as to include the stipulation that a single-track resistor be included as stipulated in claim 1 of Applicants.

Therefore, claim 1 is unpatentable over Avery in view of Wada et al.

3. ***Claims 2-5 are rejected*** under 35 U.S.C. 103(a) as being unpatentable over Avery and Wada et al as applied to claim 1 above, and further in view of Smith (6,075,271).

With regard to claim 2: As detailed above, claim 1 (on which claim 2 depends) is unpatentable over Avery in view of Wada et al. Avery also teaches the electrostatic discharge protective structure of claim 1 wherein the semiconductor body has embedded therein at least one emitter zone and at least one collector zone (42 and 44 in Fig. 4, respectively) of first conductivity type, and at least one base zone of second conductivity type (58 in Fig. 4).

Neither Avery nor Wada et al necessarily teach a well-shaped region inserted into said semiconductor body between said zones of the first conductivity types and said base zone or zones so as to extend the path length charge carriers have to travel to the base zone.

However, the use of a deeper doped region or well to significantly increase the path length that avalanche generated charge carriers have to travel as a means to increase the collector-to-emitter voltage in bipolar transistor dynamics is a method well known in the art, as witnessed by Smith, who teaches a deeper doped region or well-shaped region 80 (cf. abstract, lines 12-17, and Fig. 7) acting as a barrier for the avalanche-generated charge carriers involved in bipolar snap-back by blocking said charge carriers laterally, increasing the path length to be traversed by them, whereby a higher percentage of them reach the substrate 65 instead and are thus shunted to ground. Because of the specifically stipulated *motivation* as given above and the field of application, namely: technology to increase the bipolar snapback problem, it would have been obvious to one of ordinary skills in the art to modify the invention as essentially taught by Avery and Wada et al so as to include the further limitation of claim 2.

With regard to claims 3-5: the deeper doped region as taught by Smith is connected to zone 110 of first conductivity type (cf. column 4, lines 30-31 and column 7, lines 10-12) (*claim 3*) which is an electrode or source zone (cf. column 7, lines 8-9), while the examiner takes official notice that electrode or source zones intrinsically have a higher doping concentration than the other regions within the substrate (*claim 4*). The well-shaped region 80 extends more deeply into the substrate than said zone 110 to which it is attached (cf. Fig. 7).

4. **Claim 6 is rejected** under 35 U.S.C. 103(a) as being unpatentable over Avery, Wada et al, and Smith as applied to claim 5 above, and further in view of Li et al (5,623,387). As detailed above, claim 5 (on which claim 6 depends) is unpatentable

over Avery and Wada et al as applied to claim 1, in further view of Smith. Neither Avery, nor Wada et al, nor Smith necessarily teach the further limitation of claim 6. However, the lateral enclosure of transistors by doped zones connected through metal contacts is well known in the art as an obvious way (creation of equipotential lines through enclosure by conductors) of creating favorable conditions for a more uniform conduction of current between emitter and collector zones in transistors, as witnessed by Li et al, who teach an esd protection circuit (cf. title) involving a bipolar transistor (cf. abstract), specifically the surrounding of first conductivity type emitter and collector zones 431, 435, by second conductivity type zones 422 connected to a common metal contact 423 (cf. Fig. 6B; see also Fig. 7B) (cf. column 13, lines 54-59). Therefore, it would have been obvious to one of ordinary skills in the art to modify the invention of claim 5 so as to include the further limitation of claim 6.

5. ***Claims 7- 12 are rejected*** under 35 U.S.C. 103(a) as being unpatentable over Avery, Wada et al, Smith, and Li et al as applied to claim 6 above, and further in view of Wong et al (6,277,689). As detailed above, claim 6 (on which claim 7 depends) is unpatentable over Avery, Wada et al, and Smith, in further view of Li et al.

Avery, Wada et al, Smith, nor Li et al, necessarily teach the further limitation defined by claim 7, except for the presence of charge carriers of the first conductivity type (see Smith, column 1, lines 37-43).

However, the use of embedded wells for the purpose of combating volatility in lateral bipolar transistors is well known in the art as witnessed by Wong who teaches a

P-well 34 embedded in an N-well 36 within a substrate 38 (cf. Fig. 4 and column 3, lines 60-64).

Therefore, it would have been obvious to one of ordinary skills in the art to modify the invention as defined by claim 6 at the time at the time of the invention so as to include the further limitation of claim 7.

With regard to claim 8: emitter and collector zones 42 and 44, respectively, as shown in Fig. 4 of Avery are designed as strips and are disposed alternatingly next to one another and parallel to one another. Thus the further limitation of claim 8 does not distinguish over the prior art.

With regard to claim 9: Figure 6 in Avery shows that the electrostatic discharge structure of Avery configured and arranged in an essentially square layout. Thus the further limitation of claim 9 does not distinguish over the prior art.

With regard to claim 10: the examiner takes official notice that the provision of thorough contacts between electrodes and emitter/collector regions is an obvious requirement for any transistor: without it the current through the device would be impeded and the voltage between emitter and collector would be compromised. Therefore, the further limitation of claim 10 does not distinguish over the prior art.

With regard to claim 11: The electrostatic discharge structure taught by Wada et al comprises emitter and collector electrodes connected via conductor tracks (inherent property of electrodes in any working electronics device of which they form a part) to oppositely situated voltage buses (cf. Fig. 2) and form finger-like connections (four fingers on each side in Fig. 2) which are staggered with one another so as to render as

much electrostatic balance to the configuration as possible, as indicated by the locations L1, L2, L3, and L4 in Fig. 1 in Wada et al.

With regard to claim 12: the bipolar transistor electrostatic discharge structure as taught by Avery is designed as a field oxide bipolar transistor structure, as shown by Fig. 5.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P Mondt whose telephone number is 703-306-0531. The examiner can normally be reached on 8:00 - 18:00.

Art Unit: 2826

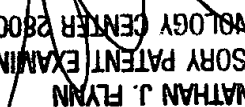
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 703-308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

JPM

November 5, 2002


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